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Test 973: Ford 8000 (Diesel)

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NEBRASKA TRACTOR TEST 973 – FORD 8000 DIESEL

POWER TAKE-OFF PERFORMANCE

Hp	Crank- shaft speed rpm	Fuel Consumption		Temperature Degrees F					Barometer inches of Mercury
		Gal per hr	Lb per hp-hr	Hp-hr per gal	Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
105.74	2300	6.585	0.434	16.06	200	58	75	28.843	
Standard Power Take-off Speed (1000 rpm)—One Hour									
94.43	1935	5.475	0.404	17.25	198	58	75	28.840	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
94.34	2412	6.151	0.454	15.34	199	60	75	.....
0.00	2503	1.911	.....	.....	194	59	72	.....
47.53	2428	3.762	0.552	12.63	196	58	76	.....
106.35	2301	6.529	0.428	16.29	200	59	76	.....
24.17	2455	2.815	0.812	8.59	194	58	74	.....
70.21	2396	4.812	0.478	14.59	197	59	76	.....
Av	57.10	2416	4.330	0.529	13.19	197	59	75	28.835

DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank- shaft speed rpm	Slip of drivers %	Fuel Consumption			Temp Degrees F			Barom- eter inches of Mercury
					Gal per hr	Lb per hp-hr	Hp-hr per gal	Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—3rd Gear											
86.72	8151	3.99	2294	8.44	6.487	0.521	13.37	187	58	74	28.885
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
72.56	6250	4.35	2438	6.07	5.718	0.549	12.69	187	47	55	29.127
50% of Pull at Maximum Power—Two Hours—3rd Gear											
48.55	4167	4.37	2397	3.99	4.379	0.629	11.09	186	53	59	29.005
MAXIMUM POWER WITH BALLAST											
80.27	11502	2.62	2427	14.72	2nd Gear			185	50	63	29.030
89.29	8361	4.00	2300	8.22	3rd Gear			189	58	71	28.940
91.32	6220	5.51	2297	5.75	4th Gear			192	57	70	28.920
89.94	5233	6.45	2298	4.82	5th Gear			185	58	71	28.940
87.20	3545	9.22	2297	3.47	6th Gear			190	58	71	28.940
80.74	2153	14.06	2302	2.17	7th Gear			188	60	76	28.890
MAXIMUM PULL WITHOUT BALLAST											
87.70	8196	4.01	2460	14.97	3rd Gear			182	46	52	28.930
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds pull				8361	8695	8900	8968	9086	8867		
Horsepower				89.29	81.79	75.00	65.58	57.19	46.48		
Crankshaft speed rpm				2300	2034	1829	1591	1371	1141		
Miles per hour				4.00	3.53	3.16	2.74	2.36	1.97		
Slip of drivers %				8.22	8.66	8.95	9.23	9.37	9.23		

TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 23.1-34; 8; 16	Two 23.1-34; 8; 16
	—Liquid	1855 lb each	None
	Cast iron	600 lb each	None
Front tire	—No, size, ply & psi	Two 10.00-16; 6; 20	Two 10.00-16; 6; 20
	—Liquid	None	None
	Cast iron	None	None
Height of drawbar		19 inches	20 inches
Static weight with operator—Rear		11650 lb	6740 lb
	Front	3135 lb	3240 lb
	Total	14785 lb	9980 lb

Department of Agricultural Engineering

Dates of Test: May 6 to May 11, 1968

Manufacturer: FORD MOTOR COMPANY,
BIRMINGHAM, MICHIGAN

FUEL, OIL and TIME Fuel No 2 Diesel Cetane No 52.4 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.8371 Weight per gallon 6.970 lb Oil SAE 10 API service classification MS, DS To motor 2.901 gal Drained from motor 2.192 gal Transmission lubricant Ford oil ESNM2C77-A Final drive lubricant Ford oil ESNM2C53-A Total time engine was operated 45½ hours.

ENGINE Make Ford Diesel Type 6 cylinder vertical Serial No TD 336436 Crankshaft mounted lengthwise Rated rpm 2300 Bore and stroke 4.4" x 4.4" Compression ratio 16.5 to 1 Displacement 401 cu in Cranking system 12 volt electric Lubrication pressure Air cleaner dry type with replaceable pleated paper element and automatic dust unloader Oil filter dual media full flow and bypass replaceable paper elements Oil cooler engine coolant heat exchanger for engine oil Fuel filter two parallel filters with replaceable folded paper elements Muffler was used Cooling medium temperature control thermostat.

CHASSIS Type standard Serial No C196710 Tread width rear 68" to 88" front 56" to 84" Wheel base 91.5" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 28.4" Vertical distance above roadway 38.0" Horizontal distance from center of rear wheel tread 0" to the right/left Hydraulic control system direct engine drive Transmission selective gear fixed ratio Advertised speeds mph first 1.8 second 2.6 third 3.9 fourth 5.2 fifth 6.1 sixth 8.6 seventh 12.9 eighth 17.3 reverse first 2.3 second 7.6 Clutch single plate dry disc operated by foot pedal Brakes oil cooled single disc brakes hydraulically actuated by two foot pedals Steering hydraulic with power assist Turning radius (on concrete surface with brake applied) right 132" left 132" (on concrete surface without brake) right 156" left 156" Turning space diameter (on concrete surface with brake applied) right 287" left 287" (on concrete surface without brake) right 322" left 322" Power take-off 540 rpm at 1900 engine rpm and 1000 rpm at 1935 engine rpm.

REPAIRS and ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

First gear was not run as it was necessary to limit the pull in second gear to avoid excessive wheel slippage. Eighth gear was not run as it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 973.

L. F. LARSEN

Engineer in Charge

G. W. STEINBRUEGGE, Chairman

J. J. SULEK

D. E. LANE

Board of Tractor Test Engineers

The University of Nebraska Agricultural Experiment Station
E. F. Frolik, Dean; H. W. Ottoson, Director; Lincoln, Nebraska

EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, $\frac{1}{2}$ of the 85% torque; maximum power, $\frac{1}{4}$ and $\frac{3}{4}$ of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of

speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Pull without Ballast. All added ballast is removed from the tractor. The drawbar pull is determined at slip limits of 15% for pneumatic tires or 7% for steel tracks or lugs. The tractor is operated at the fastest possible travel speed.

Varying Power and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions: (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the Nebraska Tractor Tests write to the Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.



FORD 8000 DIESEL